AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-14 (cancelled).

15 (new). A process for the production of olefins which process comprises feeding a paraffinic hydrocarbon-containing feedstock and a molecular oxyen-containing gas to an autothermal cracker, wherein the paraffinic hydrocarbon is partially combusted in the presence of a catalyst capable of supporting combustion beyond the normal fuel rich limit of flammability and the heat produced drives dehydrogenation to provide a hydrocarbon product stream comprising olefins, characterised in that

a) at least one unsaturated hydrocarbon is provided as a separate feedstock to the paraffinic hydrocarbon-containing feedstock and is co-fed to the autothermal cracker, and

b) the unsaturated hydrocarbon has a weight percentage of between 1-20wt% based on the weight of paraffinic hydrocarbon.

16 (new). A process according to claim 15, wherein the unsaturated hydrocarbon is one or more of an alkene, an aromatic compound, a diene and an alkyne.

17 (new). A process according to claim 16, wherein the unsaturated hydrocarbon is 1,2 butadiene, 1,3 butadiene, 2 methyl 1,3 butadiene, 1,3 pentadiene, 1,4 pentadiene and/or cyclopentadiene, preferably 1,3 butadiene.

18 (new). A process according to claim 16, wherein the unsaturated hydrocarbon is acetylene, propyne and/or a butyne, preferably acetylene.

19 (new). A process according to claim 16, wherein the autothermal cracker is operated at a total pressure of greater than 5 barg and the unsaturated hydrocarbon is benezene and/or toluene.

20 (new). A process according to claim 15, wherein the unsaturated hydrocarbon fed to the autothermal cracker comprises at least one unsaturated hydrocarbon other than an alkene, such as at least one of a diene and an alkyne, and less than 1wt%, such as less than 0.5wt%, of total alkenes, based on the weight of paraffinic hydrocarbon fed to the reactor.

21 (new). A process according to claim 15, wherein the unsaturated hydrocarbon derives from the product stream of a steam cracking reactor, the off gas stream of a fluid catalytic cracking reactor, the off gas streams of a delayed coker unit, a visbreaker unit or an alkylation unit or from a plastics recycling process, such as pyrolytic polymer cracking.

22 (new). A process according to claim 15, wherein the unsaturated hydrocarbon fed to the autothermal cracking reactor derives from the autothermal cracking product stream.

23 (new). A process according to claim 22, which process comprises the steps of:

(a) feeding a paraffinic hydrocarbon-containing feedstock and a molecular oxygen-containing gas to an autothermal cracker wherein they are reacted in the presence of a catalyst capable of supporting combustion beyond the normal fuel rich limit of flammability to provide a hydrocarbon product stream comprising olefins

(b) recovering at least a portion of the olefins product in step (a) and

(c) recycling at least one unsaturated hydrocarbon product in step (a) back to the autothermal cracker.

24 (new). A process according to claim 23 which process comprises the steps of:

(a) feeding a paraffinic hydrocarbon-containing feedstock and a molecular oxygen-containing gas to an autothermal cracker wherein they are reacted in the presence of a catalyst capable of supporting combustion beyond the normal fuel rich limit of flammability to provide a hydrocarbon product stream comprising ethane and/or propene

(b) separating the hydrocarbon product stream product in step (a) into a first stream comprising hydrocarbons containing less than 4 carbon atoms and a second stream comprising hydrocarbons containing at least 4 carbon atoms, including at least one unsaturated hydrocarbon containing at least 4 carbon atoms

(c) recovering ethane and/or propene from the first stream and

(d) recycling at least a portion of the second stream to the autothermal cracker.

25 (new). A process according to claim 24 wherein the unsaturated hydrocarbon containing at least 4 carbon atoms is selected from 1,2 butadiene, 1,3 butadiene, 2 methyl 1,3 butadiene, 1,3 pentadiene, 1,4 pentadiene and cyclopentadiene, and preferably is 1,3 butadiene.

26 (new). A process according to claim 23 which process comprises the steps of:

(a) feeding a paraffinic hydrocarbon-containing feedstock and a molecular oxygen-containing gas to an autothermal cracker wherein they are reacted in the presence of a catalyst capable of supporting combustion beyond the normal fuel rich limit of flammability to provide a hydrocarbon product stream comprising ethane and/or propene, and at least one alkyne

(b) recovering at least a portion of the ethane and/or propene product in step (a) and

(c) recycling at least a portion of the at least one alkyne product in step (a) back to the autothermal cracker.

27 (new). A process for the production of olefins which process comprises feeding a paraffinic hydrocarbon, at least one unsaturated hydrocarbon and a molecular oxygen-containing gas to an autothermal cracker wherein they are reacted in the

presence of a catalyst capable of supporting combustion beyond the normal fuel rich limit of flammability to provide a hydrocarbon product stream comprising olefins, said process being characterised in that the total hydrocarbon fed to the autothermal cracker comprises at least 20wt% of unsaturated hydrocarbons.

28 (new). The process according to claim 27, wherein the total hydrocarbon fed to the autothermal cracker comprises at least 10wt% olefins and at least 10wt% aromatics.